

### Remarks

Reconsideration and allowance are respectfully requested. Claims 25, 29, 31-34, 37, 40, 42, 45, 50, 52-55, 62, 64, 66, 67, 69-71, 74, and 79 have been amended. Claims 26-28, 30, 36, 51, 68, 75, and 76 have been canceled. Claim 82 is new. Thus, claims 25, 29, 31-35, 37-50, 52-67, 69-74, and 77-82 are pending.

The applicant provides below its specific remarks and arguments in respect to each of the examiner's comments as set out in the numbered paragraphs of the office action.

#### *Paragraph 3*

The Examiner objected to the drawings under 37 CFR 1.83(a) on the basis that the drawings do not show certain features specified in the claims. The applicant provides below a chart showing the specific claim and feature referred to by the Examiner together with exemplary drawings and submissions from the applicant concerning the sufficiency of the drawings to depict the identified features in the claims.

Claim No.	Feature	Exemplary Drawing	Applicant's submissions
43	hydrogen conversion device is an internal combustion engine	Figs.7A and 7B	The claimed feature is shown sufficiently by reference to direct conversion device 730, 738 and described at page 20 lines 30-31 of the specification. A detailed illustration of specific types of direct conversion devices is not essential for a proper understanding of invention.
44	hydrogen conversion device is a fuel cell	Figs.7A and 7B	see comment for claim 43
46	a source of electric energy includes an electricity grid	Fig. 2	The claimed feature is shown sufficiently by reference to power grid source 22 and described at page 15 line 13 of the specification
47	electricity for said electricity grid is produced by a plurality of primary energy resources	Fig. 2	Feature is sufficiently shown as power grid source 22 and described at page 4 line 19 of the specification. A detailed illustration of specific types of primary energy resources for producing electricity is not essential for a proper understanding of invention.
48	said primary energy resources include renewable resources	Fig. 2	see comment for claim 47 and description at page 8 lines 19-24 of the specification

49	said primary energy resources include fossil fuels, wind, solar, nuclear and hydro	Fig. 2	see comment for claim 47 and description at page 5 lines 1-2 of the specification
50-53	energy source data includes real time data, historical data, forecasted data, energy cost data	Figs. 2 and 4	note amendment of claims 51 and 52 to "stored data" which could include either historical data or forecasted data. The claimed features are sufficiently shown as power grid source 22 and controller 14 in Fig. 2. Both real time and stored data are supported at page 15 line 22 and energy cost data is supported at page 16 line 7 of the specification. A detailed illustration of "data" is not required in the figures for a proper understanding of the invention.
56	electricity generated by a hydrogen conversion device is transmitted to an electricity grid	Figs. 7A and B	claimed feature is sufficiently shown as direct conversion device 730, 738 and described at page 9 lines 18-20 and page 11 lines 25-30 of the specification. A detailed illustration of specific direct conversion devices and transmission to the grid is not essential for a proper understanding of invention.
57	a non-grid source of electric energy	Fig. 1	claimed feature is sufficiently shown as energy source 12 and described at page 13 lines 18-20 of specification.
58	electricity for said at least one non-grid source of electric energy is produced by at least one primary energy resource	Fig. 1	see comment for claim 57. A detailed illustration of specific energy resources for producing electricity is not essential for a proper understanding of invention.
62	a source of electric energy includes an electricity grid and at least one non-grid source of electric energy and wherein said controller selects one of said at least one sources of electric energy based on data including said energy source data	see Figs. 7A and B	claimed feature is sufficiently shown as energy source 12 and network controller 722 and description at page 20 lines 21-26 and page 21 lines 8-13 of specification.

66	energy source data includes data pertaining to emissions associated with the primary energy resources used for producing said electricity	Fig. 2	note amendment of claim to replace “emissions associated with the” with “the type of”. Claimed features are sufficiently shown as power grid source 22 and described at page 16 line 6 of specification. A detailed illustration of “data” is not required in the figures for a proper understanding of the invention.
67	energy source data includes data pertaining to credits awarded for use of certain energy sources	Fig. 2	Claimed feature is sufficiently shown as power grid source 22 and described at page 10 lines 1-3 of specification. A detailed illustration of “data” is not required in the figures for a proper understanding of the invention.
70	a hydrogen storage apparatus comprises at least one hydride storage chamber	Fig. 7A	Claimed feature is sufficiently shown as storage unit 726 and described at page 10 lines 12-13
71	a hydrogen storage apparatus comprises at least one container for storing pressurized hydrogen	Fig. 7A	see comment for claim 70
75	a controller comprises a processor for processing said data	Figs. 2 and 4	note claim cancelled in view of amendment to claim 1. Feature is sufficiently shown as network controller 14 in Fig. 2 and control network hub 50 and slave controller 40 in Fig. 4 and described at page 4 lines 25-26, page 15, lines 9-24 and page 17 lines 10-30.
76	a controller comprises a processor for processing said data and a control system for controlling the operation of said hydrogen generator	Figs 2 and 4	note claim cancelled in view of amendment to claim 1. See comments for claim 75
77	data is transmitted to said controller using the same wires that are used to deliver said electricity	Fig. 4	Claimed feature shown sufficiently as energy source 52, data conduit 54 and control network hub 50 and described at page 8 lines 14-18 and page 17 lines 17-19 and 24-25 of specification

78	data is transmitted to said controller by wireless transmission	Fig. 4	see comment for claim 77
79	a data processor including a hydrogen generator data processor for processing data concerning said hydrogen generator, a hydrogen storage data processor for processing data concerning said hydrogen storage apparatus, a hydrogen demand data processor for processing data concerning hydrogen demand and an energy source data processor for processing data concerning said source of electric energy  and a controller for controlling the generation and storage of hydrogen based on inputs including inputs received from said data processor	n/a	claim amended to remove features objected to by examiner.

Based upon the arguments presented above, the applicant submits that the claims as amended are adequately supported by the drawings pursuant to the requirements of 37 CFR 1.83 and that no corrected drawing sheets are required.

*Paragraph 4*

In paragraph 4 of the office action the Examiner objected to the title of the invention on the basis that it was not descriptive of the invention to which the claims were directed. The applicant has amended its title to "Hydrogen Energy System" which the applicant submits is consistent with the subject matter described in the claims.

*Paragraph 5*

In paragraph 5 of the office action the Examiner referred to the requirements for ordering dependent claims in an application. It does not appear that the Examiner has raised any

objection to the current ordering of the applicant's dependent claims and accordingly no amendment has been made to address this statement made by the Examiner.

*Paragraphs 6-9*

In paragraphs 6-9 of the office action, the Examiner objected to claims 51, 52, 66, 67 and 77 of the application under 35 USC 112 as failing to comply with the written description requirement. In the chart below the applicant addresses each of the claims objected to by the Examiner.

Claim No.	Claim	Comments
51	A system as claimed in claim 25 wherein said energy source data includes historical data.	claim cancelled (see comment for claim 52)
52	A system as claimed in claim 25 wherein said energy source data includes forecasted data.	claim amended to refer to "stored data" which is supported at page 15 line 22. The applicant submits that the specification provides sufficient written description for any person skilled in the art to make and use the invention. Applicant further submits, for clarity, that 'stored data' may include historical data and forecasted data.
66	A system as claimed in claim 25 wherein said energy source data includes data pertaining to emissions associated with the primary energy resources used for producing said electricity.	note amendment of claim to change "emissions associated with the" to "the type of". See page 16 line 6 of specification for support. The applicant submits that the specification provides sufficient written description for any person skilled in the art to make and use the invention as claimed.
67	A system as claimed in claim 25 wherein said energy source data includes data pertaining to credits awarded for use of certain energy sources.	see page 10 lines 1-3 of specification for support. The applicant submits that the specification provides sufficient written description for any person skilled in the art to make and use the invention as claimed.
77	A system as claimed in claim 25 wherein said data is transmitted to said controller using the same wires that are used to deliver said electricity.	In addition to the portion of the specification referred to by the Examiner, see energy source 52, data conduit 54 and control network hub 50 in Fig. 4 and page 17 lines 17-25 of

	specification. The applicant submits that the specification provides sufficient written description for any person skilled in the art to make and use the invention as claimed.
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Based upon the arguments presented above, the applicant submits that all of the claims as amended meet the written description requirement under 35 USC 112.

*Paragraph 10*

In paragraph 10 of the office action, the Examiner rejected claims 31-33, 50-55, 62, 64, 66-67, 79-81 under 35 USC 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In the chart below, the applicant provides its specific comments to each of the objections raised by the Examiner.

Claim No.	Objections	Comments
31	Claim 31 recites the limitation "said controller inputs" in line 1.	amended to include antecedent
32	Claim 32 recites the limitation "said controller inputs" in line 1.	amended to include antecedent
33	Claim 33 recites the limitation "said controller inputs" in line 1.	amended to include antecedent
50-53	Claims 50-53 recite the limitation "said energy source data" in line 1.	claims 1, 50, 52 and 53 amended to include antecedent. Claim 51 cancelled.
54	Claim 54 recites the limitation "said energy source data" in lines 2-3.	amended to include antecedent
55	Claim 55 recites the limitation "said energy source data" in line 3.	amended to include antecedent
62	Claim 62 recites the limitation "said energy source data" in line 4.	amended to include antecedent
64	Claim 64 recites the limitation "said energy source data" in line 3.	amended to include antecedent
66-67	Claims 66-67 recite the limitation "said energy source data" in line 1. Claim 66 recites the limitation "the primary energy	claim 66 amended to include antecedent. claim 67 cancelled.

	resources" in line 2.	
79-81	Claim 79 recites the limitation "said at least one source of electric energy" in section c. There is insufficient antecedent basis for these limitations in the claims.	claim 79 amended to remove language objected to

Based upon the arguments or amendments presented above, the applicant submits that all of the claims as amended meet the antecedent requirement under 35 USC 112. Therefore, the rejection should be withdrawn.

*Paragraph 11*

In paragraph 11 of the office action, the Examiner rejected claims 25, 26, 28, 30, 31, 40, 42, 44, 46, 50, 57, 58, 68, 72, 74 and 77 under 35 USC 102(b) has been anticipated by U.S. Patent No. 4,689,133 (McIlhenny).

McIlhenny is directed to a closed system having a fuel cell 10 that is directly electrically coupled to an electrolysis cell 12. The electrolysis cell operates through electrolysis of sodium chloride brine as opposed to electrolysis of water as provided in the applicant's invention. All of the hydrogen generated by the electrolysis cell is fed via line 50 to line 46 as supplementary hydrogen fuel for fuel cell 10. Thus, McIlhenny does not disclose a hydrogen storage apparatus for storing hydrogen generated by the electrolysis cell as provided in the applicant's invention (McIlhenny is silent as to the primary source of hydrogen fed through line 46). Furthermore, McIlhenny does not disclose a controller that is operatively connected to the hydrogen generator for controlling the generation of hydrogen based in part upon certain control inputs as provided in the applicant's invention. Instead, McIlhenny discloses a voltage comparator 26 that controls a valve 36 for varying the diluent that is contained in the feed stream to the fuel cell.

In view of the above described differences from the applicant's invention, as claimed in applicant's amended claim 25, the applicant submits that claim 25 and all claims depending therefrom are allowable under 35 USC 102 over McIlhenny.

*Paragraph 12*

In paragraph 12 of the office action, the Examiner rejected claims 25-31, 33, 40-45, 57, 58, 68, 70-72, and 74-76 under 35 USC 102(b) as being anticipated by U.S. Patent No. 5,372,617 (Kerrebrock).

Kerrebrock is directed to undersea vehicle fuel cell systems that use hydrogen generated through hydrolysis of hydrides. Thus, Kerrebrock does not disclose a water electrolysis based hydrogen generator. Kerrebrock furthermore does not disclose a controller that is connected to the hydrogen generator for controlling generation of hydrogen based on data including data concerning the availability of electrical energy for use by the hydrogen generator.

In view of these differences from the applicant's invention, as claimed in applicant's amended claim 25, the applicant submits that claim 25 and all claims depending therefrom are allowable under 35 USC 102 over Kerrebrock.

*Paragraph 13*

In paragraph 13 of the office action, the Examiner rejected claims 25, 26, 28, 30, 31, 40, 42-49, 54, 57-61, 68, 71, 72, 74, and 77 under 35 USC 102(b) as being anticipated by U.S. Patent No. 5,592,028 (Pritchard).

Pritchard is directed to a wind farm system and method that includes an electrolysis plant 5, hydrogen storage means 8 and an electrical generation plant 20. The electrolysis plant has electrolysis cells 35 that have an optimum operating voltage at which they operate with maximum efficiency. A voltage dependant switch 32 is provided to ensure that each cell 35 receives the correct voltage to ensure maximum efficiency. The specification states that the switch includes a control means arranged to cause it to adopt a particular position dependant on the voltage across it. The switch does not provide a computer processor for receiving and processing control inputs as provided in the applicant's invention. Furthermore, the switch adopts a particular position based on the voltage across the switch and is not based on processed data including data concerning the availability of electrical energy for use by said hydrogen generator as provided in the applicant's invention.

In view of the above described differences from the applicant's invention, as claimed in applicant's amended claim 25, the applicant submits that claim 25 and all claims depending therefrom are allowable under 35 USC 102 over Pritchard.

*Paragraph 14*

In paragraph 14 of the office action, the Examiner rejected claims 25-40, 42, 44, 45, 54, 55, 57, 58, 68, 69, 70, 71, 72, 73, 75-77, 79-81 under 35 USC 102(b) as being anticipated by U.S. Patent No. 5,527,632 to (Gardner).

Gardner is directed to a hydrocarbon fuelled fuel cell power system that utilizes a reformer 14 for generating hydrogen instead of a water electrolysis based hydrogen generator as provided by the applicant's invention. Gardner further provides a hydrogen store 16 for storing hydrogen received from a hydrogen pump 18. Hydrogen pump 18 functions as an electrochemical purifier and compressor of hydrogen received from reformer 14. Hydrogen pump does not generate hydrogen on its own. Gardner provides a controller 50 for controlling the hydrogen pump 18. The controller receives signals from pressure sensor 52 connected to reformer 14 and voltage/current sensor 54 connected to fuel cell stack 12. Thus the controller does not control the generation of hydrogen based on control inputs including data pertaining to the availability of electrical energy for use by said hydrogen generator.

In view of the above described differences from the applicant's invention, as claimed in applicant's amended claim 25, the applicant submits that claim 25 and all claims depending therefrom are allowable under 35 USC 102 over Gardner.



*Paragraph 15*

In paragraph 15 of the office action, the Examiner rejected claims 55, 56 and 62-65 under 35 USC 103(a) as being unpatentable over Pritchard in view of Kohlstruck.

The Examiner admits that Pritchard fails to teach a controller that selects one of the sources of electric energy based on data including energy source data, wherein the controller modulates the generation of electricity based on such source data and wherein at least some of the electricity is transmitted to an electricity grid. The Examiner submits that these features are taught by the Kohlstruck reference and that it would be obvious to one of ordinary skill in the art to combine the teachings of Kohlstruck and Pritchard to arrive at the claimed invention. The Examiner argues that one of ordinary skill in the art would be motivated to combine these references because Kohlstruck teaches an interruption free current supply arrangement for AC voltage that generates AC for customers without a large outlay within a short period of time after the network voltage has fallen below a pre-determined threshold value.

The applicant repeats the arguments submitted above in respect to Pritchard under 35 USC 102 and submits that claims 55, 56 and 62-65, being dependent from amended claim 25, are also allowable.

*Paragraph 16*

In paragraph 16 of the office action, the Examiner rejected claims 29 and 69 under 35 USC 103(a) as being unpatentable over Pritchard as applied to claim 28 above and further in view of Checketts. The Examiner admits that Pritchard fails to teach the controller further processing data concerning the hydrogen storage apparatus wherein the controller initiates operation of the hydrogen generator to generate hydrogen when the amount of hydrogen stored in the storage apparatus falls below a predetermined amount. The Examiner argues that the Checketts reference teaches analogist art and that it would have been obvious to one ordinary skill in the art at the time of the invention to combine the teachings of Checketts with the teachings of Pritchard. The Examiner argues that one of ordinary skill in the art would have been motivated to combine these references because Checketts teaches a computer system that keeps track of the cells that have not been chemically reacted and will project the number of cells that are needed to the reactor to restore the tank pressure to within a desired range.

The applicant repeats the arguments submitted above in respect to Pritchard under 35 USC 102 and submits that claims 29 and 69, being dependent from amended claim 25, are also allowable.

*Paragraph 17*

In paragraph 17 of the office action, the Examiner rejected claims 50-53, 66, 67 and 73 under 35 USC 103(a) as being unpatentable over Pritchard as applied to claim 25 above and further in view of Meystel. The Examiner admits that Pritchard fails to teach energy source data including real time data historical data, forecasted data, energy cost data and data pertaining to emissions associated with a primary energy resource is used for producing electricity, data pertaining to credits awarded for use of certain energy resources, wherein a controller controls the duration of electricity supply to the generator. The Examiner argues that Meystel teaches analogous art and that it would have been obvious to one of ordinary skill in the art at the time the invention was

made to combine the teachings of Meystel with the teachings of Pritchard. The Examiner argues that one of ordinary skill in the art would have been motivated to combine these references because Meystel teaches a multi-resolutional decision support system that determines optimal controls using multi-resolutional analysis of acquired data wherein analog base is created to be searched for optimal controls.

The applicant repeats the arguments submitted above in respect to Pritchard under 35 USC 102 and submits that claims 50-53, 66, 67 and 73 , being dependent from amended claim 25, are also allowable.

Furthermore, Meystel is not directed to a hydrogen energy system and in particular to a system in which the generation of hydrogen is controlled by a controller having a computer processor for receiving and processing control inputs including data concerning the availability of electrical energy for use by the hydrogen generator. Accordingly, the applicant submits that Meystel does not teach analogous art and that it would not be obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Meystel with the teachings of Pritchard.

Furthermore, the applicant submits that Meytel does not disclose the subject matter claimed in the identified dependent claims. The examiner's reference to column 8, lines 1-64 of Meytel does not clearly identify a disclosure or suggestion in Meytel of the identified claim elements.

For all these reasons, the applicant submits that the identified dependant claims are allowable over the cited references under 35 USC 103.

#### Paragraph 18

In paragraph 18 of the office action, the Examiner rejected claims 50-53, 67, 73 and 78 under 35 USC 103(a) as being unpatentable over Pritchard as applied to claim 25 above and further in view of McNamara. The Examiner admits that Pritchard fails to teach energy source data including real time data, historical data, forecasted data, energy cost data, data is transmitted to controller by wireless transmission, data pertaining to credits awarded for use of certain energy sources, wherein a controller controls the duration of electricity supply to the generator. The Examiner argues that McNamara teaches analogist art and that it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of McNamara with the teachings of Pritchard. The Examiner argues that one of ordinary skill in the art would have been motivated to combine the references because McNamara teaches a communications channel that allows for the collection and transmission of user demand requirements and control of user demand services wherein distributed networks connect to central computer systems via high speed digital lines and permits automatic meter reading and remote services.

The applicant repeats the arguments submitted above in respect to Pritchard under 35 USC 102 and submits that claims 50-53, 67, 73 and 78, being dependent from amended claim 25, are also allowable.

Furthermore, McNamara is not directed to a hydrogen energy system and in particular to a system in which the generation of hydrogen is controlled by a controller having a computer

processor for receiving and processing control inputs including data concerning the availability of electrical energy for use by the hydrogen generator. Accordingly, the applicant submits that McNamara does not teach analogous art and that it would not be obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of McNamara with the teachings of Pritchard.

Furthermore, the applicant submits that McNamara does not disclose the subject matter claimed in the identified dependent claims. The examiner's reference to column 7-8, claims 14 of McNamara does not clearly identify a disclosure or suggestion in McNamara of the identified claim elements.

For all these reasons, the applicant submits that the identified dependant claims are allowable over the cited references under 35 USC 103.

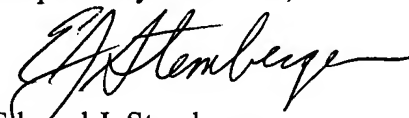
### *Conclusion*

In summary, the applicant submits that it has overcome all of the objections raised by the Examiner and requests reconsideration and allowance of the claims that have been submitted herewith.

If the Examiner believes that a personal Interview would be helpful in advancing prosecution of this Application, the Examiner is requested to contact the undersigned to arranged a meeting.

To the extent necessary, Applicant petitions for an extension of time under 37 C.F.R. 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including any missing or insufficient fees under 37 C.F.R. 1.17(a), to Deposit Account No. 50-0687, under Order No. 62-338, and please credit any excess fees to such deposit account.

Respectfully submitted,



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